Spot Safety Project Evaluation

Project Log # 200712080

Spot Safety Project # 06-98-200

Spot Safety Project Evaluation of the Left Turn Lane Installation
At the Intersection of NC 41 and SR 2235 (Dallas Rd / Old Stage Rd)
Robeson County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ _____
Jason B. Schronce Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-98-200 – The Intersection of NC 41 and SR 2235 (Dallas Road / Old Stage Road), which is south of the City of Lumberton, in Robeson County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the roadway widening for the installation of left turn lanes on the NC 41 approaches. In the before period, NC 41 and SR 2235 were both two-lane facilities at the subject intersection with no turn lanes and speed limits of 55 mph. The subject location is a crossroads type intersection, which is controlled by dual posted stop signs with concrete channelization medians on SR 2235. A convenient store occupies the southwest quadrant with private residences located in two of the other quadrants at the intersection.

The original statement of problem was the lack of left turn storage resulting in patterns of rear-end and ran-off roadway type collisions. The intersection improvements were requested by the Mayor of the Town of Fairmont during a public Transportation Improvement Program meeting.

The initial crash analysis was completed from November 1, 1994 to October 31, 1997 with twelve (12) reported crashes, resulting in thirteen (13) c-class injuries. The final completion date for the improvement at the subject intersection was on August 1, 2002 with a total cost of $75,000.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was the months of July and August of 2002. The before period consisted of reported crashes from May 1, 1997 through June 30, 2002 (5 years and 2 months); and the after period consisted of reported crashes from September 1, 2002 through October 31, 2007 (5 years and 2 months). The ending date for this analysis was determined by the date of available data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that mainline (NC-41) Rear-End Crashes and avoidance of a rear-end collision resulting in a Ran-Off Roadway Crashes were the target crashes for the applied countermeasure.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	11	5	- 54.55 %
Total Severity Index	6.38	5.44	- 14.73 %
Target Crashes	3	0	- 100.00 %
Target Crash Severity Index	5.93	0.00	- 100.00 %
Volume	8,700	9,600	10.34 %
Injury Crash Summary – Total			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	4	1	- 75.00 %
Class C Injury Crashes	4	2	- 50.00 %
Total Injury Crashes	8	3	- 62.50 %

The naive before and after analysis at the treatment location resulted in a 54.5 percent decrease in Total Crashes, complete elimination of Target Crashes, and a 15 percent decrease in the Total Severity Index. The before period ADT year was 1999 and the after period ADT year was 2005.

Results and Discussion

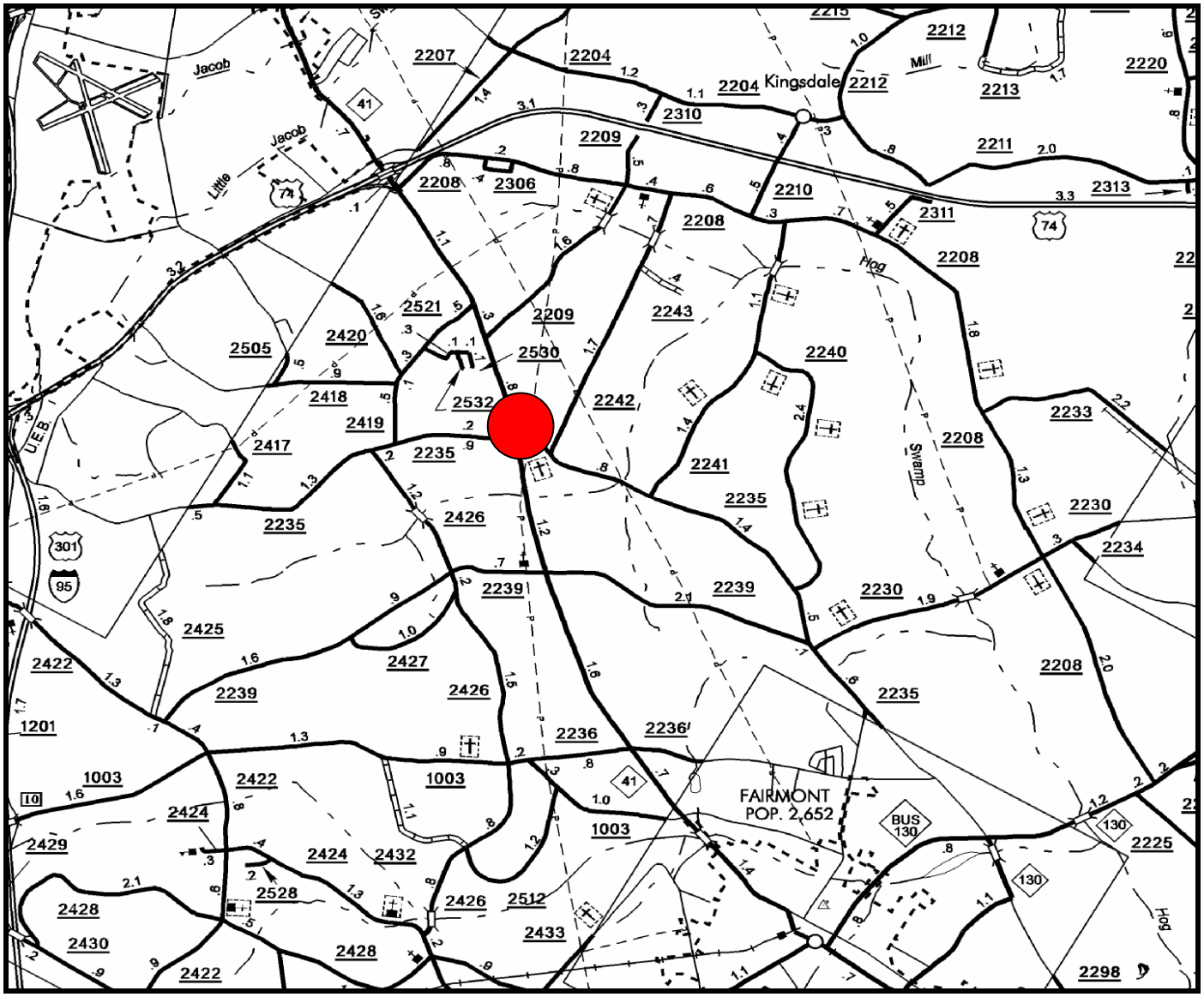
The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 54.5 percent decrease in Total Crashes and complete elimination of Target Crashes. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the crash patterns seen in the before period of NC 41 rear-end collisions and angle collisions of vehicles attempting to cross NC 41 were completely eliminated in the after period. The installation of the left turn lanes appear to have created enough storage so that motorists are not forced to make quick decisions concerning left turning movements onto SR 2235.

The calculated benefit to cost ratio for this project is 2.26 considering total crashes. The benefit to cost ratio considering only target crashes is 0.96. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment intersection. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Location Map
Robeson County
Evaluation of Spot Safety Project # 06-98-200



Treatment Location: NC 41 at SR 2235 (Dallas Road / Old Stage Road)

06-98-200 Aerial Map
Robeson County

TREATMENT SITE PHOTOS TAKEN 4/8/2008

Traveling North on NC 41

Traveling North on NC 41

Traveling South on NC 41

Traveling South on NC 41

Traveling East on SR 2235 (Dallas Road)

Traveling West on SR 2235 (Old Stage Road)

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 41 at SR 2235 | BY: JBS
COUNTY: Robeson | DATE: 4/17/2008
FILE NO.: SS 06-98-200 | NOTES: Total Crashes

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lanes on NC 41 approaches

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$75,000	20	0.102	$7,639
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$75,000	20	0.102	$7,639

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $400
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $8,039
TOTAL COST OF PROJECT= $75,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.17	0	0.00	8	1.55	3	0.58	$30,116
AFTER	5.17	0	0.00	3	0.58	2	0.39	$11,954

Annual Benefits from Crash Cost Savings $18,162

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $10,124

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 2.26

TOTAL COST OF PROJECT - $75,000 COMPREHENSIVE B/C RATIO - 2.26

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 41 at SR 2235 | BY: JBS
COUNTY: Robeson | DATE: 4/17/2008
FILE NO.: SS 06-98-200 | NOTES: Target Crashes

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ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

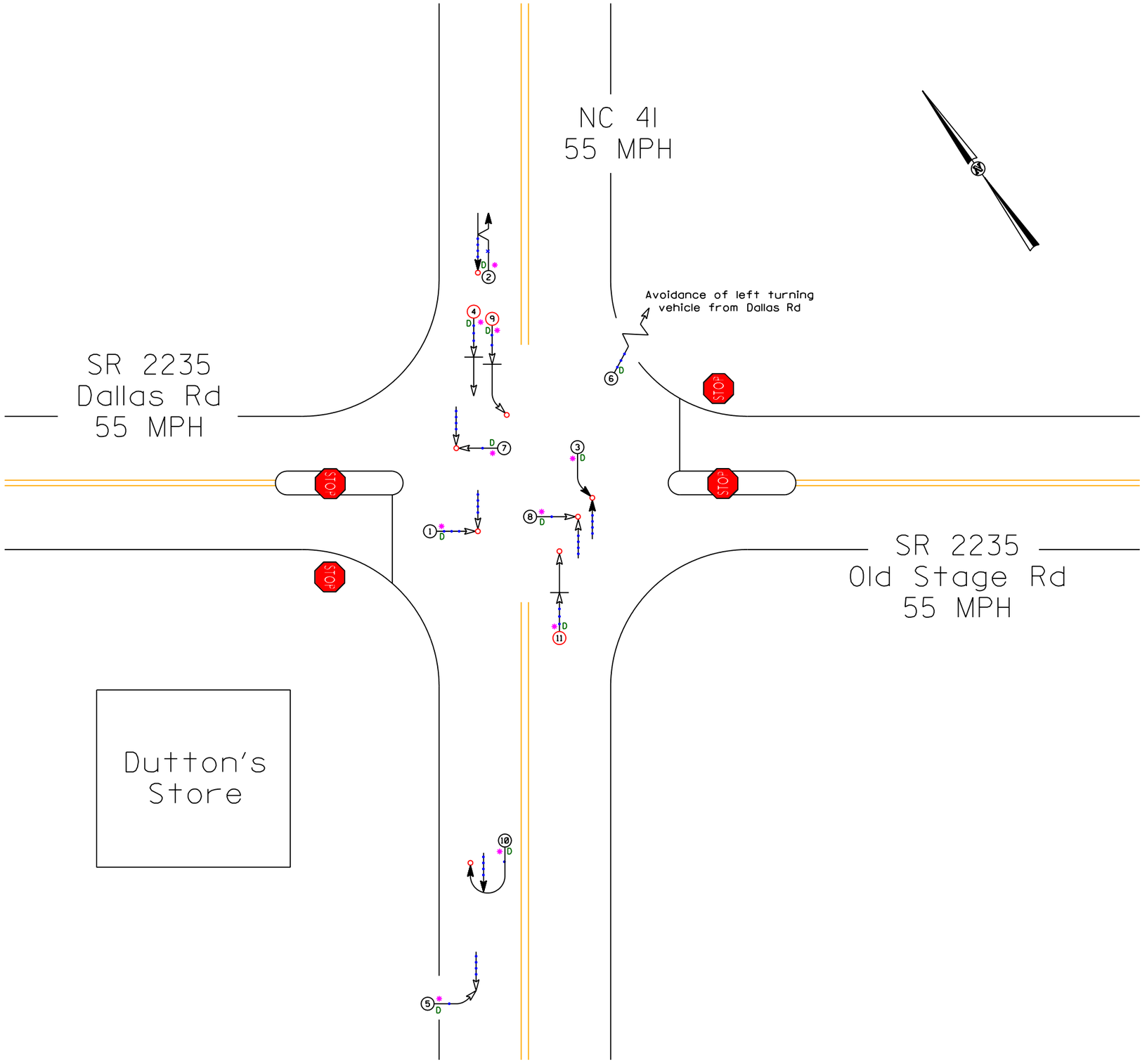
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.17	0	0.00	2	0.39	1	0.19	$7,718
AFTER	5.17	0	0.00	0	0.00	0	0.00	$0

Annual Benefits from Crash Cost Savings $7,718

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($321)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.96

TOTAL COST OF PROJECT - $75,000 COMPREHENSIVE B/C RATIO - 0.96



LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

9 MPH OR LESS
10 MPH TO 19
20 MPH TO 29
30 MPH TO 39
40 MPH TO 49
50 MPH TO 59
60 MPH TO 69
70 AND UP
SPEED UNKNOWN

P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY

SS# 06-98-200
Robeson County
BEFORE Period
5/1/97 - 6/30/02
NC 41 at SR 2235

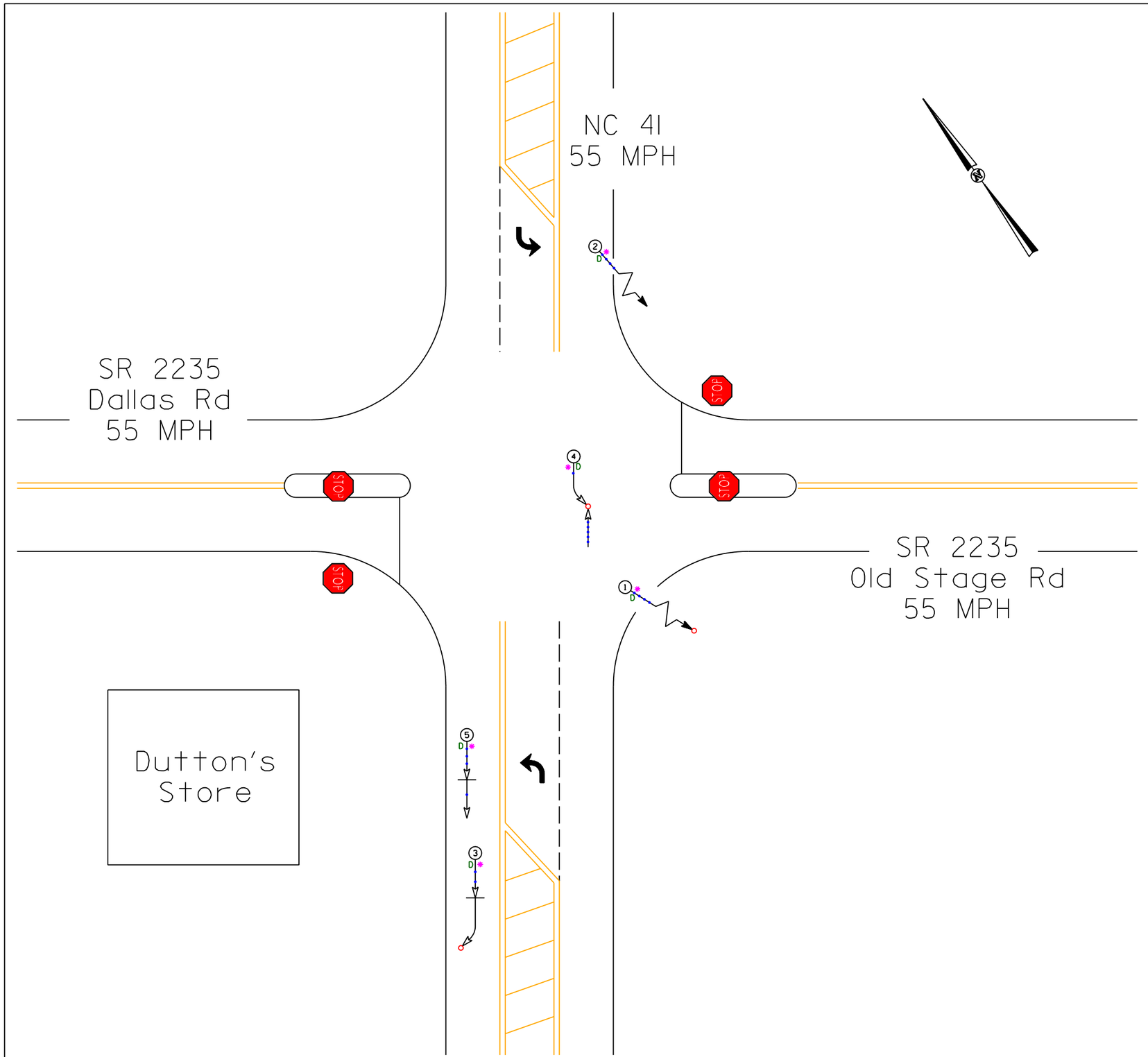
(#) Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

HIGHWAY SAFETY PLANNING AND ANALYSIS
HIGHWAY SAFETY IMPROVEMENT PROGRAM
HIGHWAY SAFETY MANAGEMENT
RAILROAD-HIGHWAY SAFETY MANAGEMENT

COLLISION DIAGRAM	
DIVISION: 6	AREA:
STUDY PERIOD: 5/1/1997 - 6/30/2002	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: ST	
DIAGRAM REVIEWED BY: JBS	
SCALE: NOT TO SCALE	
DATE: 4-2-2008	
LOG NUMBER: SS# 06-98-200	

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH



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SS# 06-98-200
Robeson County
AFTER Period
9/1/02 - 10/31/07
NC 41 at SR 2235

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

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